REFERENCE 3

Idaho National Engineering Laboratory

FAH-06-87

From F. A. Hohorst
Phone 6-4542/IRC
Date October 12, 1987
Subject: Radiological Residues at the CFSGF Ash Pit as of September 30, 1987

To B. G. Motes, Manager
Effluent Monitoring Subsection

Ref: (1) F. A. Hohorst, FAH-20-85, to G. J. McManus, "Interim Report on Radiological Residues from the CFSGF," dated October 21, 1985

(2) F. A. Hohorst, FAH-6-86, to G. J. McManus, "Second Interim Report on Radiological Residues at the CFSGF," dated March 3, 1986

(3) F. A. Hohorst, FAH-15-86, to B.G. Motes, "Radiological Residues at the CFSGF Ash Pit as of September 30, 1986," dated October 20, 1986

cc: T. W. Chesnovar
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A. J. Matule
B. R. Wheeler
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This letter represents an update on the radiological residues at the Coal Fired Steam Generation Facility (CFSGF) ash pit as of September 30, 1987, and postulated quantities of radiological residues when the current ash disposal pit is completely filled. The CFSGF is a complex southeast of the main ICPP security fence which consists of a 750 by 450 foot enclosure containing several buildings, the principal one being CPP-687. The current ash disposal pit has no facility identification number. It is a 645 x 395 x 11 foot pit due east of this complex, centered at site coordinates N693292/E298210.

The inventory of radioactivity in residues at the CFSGF ash pit has been the subject of three prior letters (References 1-3). Reference 1 made a preliminary estimate of the inventory in the residues based on typical concentrations. Reference 2 reported the actual inventories based on results of analyses of samples taken from the CFSGF and included specific estimates from the data through FY-85. Reference 3 summarized data and reported estimates for FY-86

This letter reports FY-87 data and accumulations to date. Coal consumption during FY-87 was 12995 tons (1.179×10^7 kg). The FY-87 supplier for the coal was the same supplier as in FY-86, the U.S. Coal Co., Hiawatha Mine, Price, UT. Limestone consumption was 3479 tons (3.156×10^6 kg). During FY-87, the supplier of most of the limestone was Bighorn Calcium Co, Billings, MT. Of the total limestone consumed, 100 tons (9.072×10^4 kg or 2.9%) used in in-plant testing came from the Treasure Canyon Mine.

Gamma analysis of a sample of each limestone was reported in Reference 3. There data were used in computing the quantities of the radioisotopes potassium-40, thorium-232, and uranium-238 reported in subsequent tables.

Dumping at the ash pit east of the CFSGF continued, adding a calculated 4390 tons (3.98×10^6 kg) of ash, i.e., limestone residues plus coal ash, to the west half of the pit in FY-87. Figure 1 was prepared from an EG&G Idaho high altitude photograph taken on May 5, 1987, at 1047. It documents physical changes at the ash pit since the previous photograph on June 22, 1986. No new areas in the pit have been opened to dumping.

In August 1987, EG&G Idaho at the request of WINCO Production, measured the remaining volume in the pit as 66,200 cubic yards (50,600 m^3). The initial volume of the pit in 1984 was 73,000 m^3. Hence, 22,000 m^3 of ash has been added to the pit since the start of the CFSGF.

Using these data and data in Reference 2 and 3, Tables 1 and 2 were prepared reporting the changes during the year for thorium-232 and uranium-238, respectively. The calculated increase in these radioisotopes was 14 kilograms of thorium-232 and 20 kilograms of uranium-238. Assuming a natural isotopic abundance of uranium-235, its increase was 0.14 kg.

Table 3 summarizes the use of coal and limestone, and the inventory of ash, for FY-87 and their cumulative quantities to date. The total calculated volume of ash in the CFSGF ash pit is 22,000 cubic meters (780,000 cubic feet) as of September 30, 1987. This represents an increase of 5570 cubic meters since October 1, 1986.

Table 4 summarizes the changes to the inventories of radioisotopes for FY-87 and the quantities to date. The total estimated quantity of radioisotopes in the CFSGF ash pit was 0.40 curie as of September 30, 1987. This represents an increase of 0.11 curie since October 1, 1986. These estimates assume secular equilibrium in the thorium-232, uranium-235, and uranium-238 decay chains.

If filling proceeds at the FY-87 rate, the ash pit will be completely filled by the end of FY-96. At that time, it will hold 52,000,000 kg of ash containing a total of 1.44 Ci of radioactivity. This radioactivity will result from decay of the following radioisotopes which will be uniformily distributed throughout the ash:

Potassium-40	<0.001 Ci	<0.1 kg
Thorium-232 & progeny	0.21	180.
Uranium-235 & progeny	0.046	1.8
Uranium-238 & progeny	1.18	250.

If you have any questions, please call me.

Frederick A. Hohorst

/gb

TABLE 1

FY-87 Mass Increase of Thorium-232 at CFSGF

	Consumed (g)	Assay (Ci g-1)	Activity (Ci)
Coal:			
Hiawatha	1.18×10^{10}	1.2×10^{-13}	1.4×10^{-3}
Limestone:			
Treasure Canyon	9.07×10^{7}	1.1×10^{-14}	1.0×10^{-6}
Bighorn Calcium	3.07×10^{9}	1.9×10^{-14}	5.8×10^{-5}

TOTAL

Thorium-232 Calculated = 1.5×10^{-3} Ci

Thorium-232 Calculated = 14 kg

TABLE 2

FY-87 Mass Increase of Uranium-238 at CFSGF

	Consumed (g)	Assay (Ci g-1)	Activity (Ci)
Coal:			
Hiawatha	1.18×10^{10}	4.4×10^{-13}	5.2×10^{-3}
Limestone:			
Treasure Canyon	9.07×10^{7}	1.0×10^{-13}	9.1×10^{-6}
Bighorn Calcium	3.07×10^{9}	5.1×10^{-13}	1.6×10^{-3}

TOTAL

Uranium-238 Calculated = 6.8×10^{-3} Ci
Uranium-238 Calculated = 20 kg

TABLE 3

FY-87 Coal and Limestone Use, and Ash Generated

Item	Unit	FY-87	Cumulative On 9/30/87
Coal	kilograms	11,790,000	36,540,000[a]
Limestone	kilograms	3,156,000	8,559,000[a]
Ash	kilograms	3,981,000	11,117,000[a]
Ash	cubic meters	5,600	22,000

[a]Records of purchases are incomplete prior to FY-85.

TABLE 4

FY-87 Radioisotope Inventory at the CFSGF Ash Pit

Radioisotope	Unit	FY-87	Cumulative On 9/30/87
Potassium-40	Ci	<0.0001	<0.001
Thorium-232 & Progeny	Ci	0.016	0.063
Uranium-235 & Progeny	Ci	0.0037	0.012
Uranium-238 & Progeny	Ci	0.095	0.32
TOTAL	Ci	0.11	0.40

FIGURE 1

CFSGF Including the Ash Pit
(From EG&G Photograph 87-326-1-7, May 5, 1987, @ 1047)

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